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UNITED STATES GEOLOGICAL SURVEY OF THE TERRITORIES
F. V. HAYDEN GEOLOGIST IN CHARGE.
ILLUSTRATIONS
OF
CRETACEOUS AND TERTIARY PLANTS

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Hayden

Als zu den "Publications" gehörig betrachtet?

With the compliments of

F. V. Hayden,

U. S. Geologist.

DEPARTMENT OF THE INTERIOR.
U. S. GEOLOGICAL AND GEOGRAPHICAL SURVEY OF THE TERRITORIES.
F. V. HAYDEN, U. S. GEOLOGIST-IN-CHARGE.

ILLUSTRATIONS
OF
CRETACEOUS AND TERTIARY PLANTS
OF THE
WESTERN TERRITORIES
OF THE
UNITED STATES.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1878.



PREFATORY NOTE.

OFFICE OF UNITED STATES GEOLOGICAL AND
GEOGRAPHICAL SURVEY OF THE TERRITORIES,
Washington, January 1, 1878.

A small edition of five hundred copies of the accompanying plates of fossil plants, from the Cretaceous and Tertiary strata of the Western Territories, is issued at this time for the use of botanists in this country and in Europe. These plates, twenty-six in number and twenty-five hundred copies of each, have now been engraved and printed for a period of seven years, awaiting the final report by Dr. J. S. Newberry. The greater portion of the species have been described in an article in the *Annals of the Lyceum of Natural History of New York*, read April 22, 1867, and published in April, 1868, entitled "Notes on the Later Extinct Floras of North America, with descriptions of some new species of Fossil Plants from the Cretaceous and Tertiary strata", to which the attention of the reader is referred. The fossil plants themselves form a portion of the collections that were made by me during the earlier years of my explorations in the Northwest, commencing in the spring of 1854. The Cretaceous plants are mostly from the Rusty Sandstones of the Dakota Group in Nebraska, while the Tertiary were obtained from the Fort Union Group along the Upper Missouri and Yellowstone Rivers.

I will not discuss the differences of opinion in regard to the age of the Tertiary plants in this connection. It is sufficient to state that up to 1870 they were admitted to be of Miocene age without dispute.

The names and references were prepared by Prof. Lesquereux, at my request, from a comparison of the descriptions with the figures, and also by examination of specimens of a number of the species preserved in the Museum of the Smithsonian Institution. Should the text, which was intended to form Vol. VIII of the quarto series, never appear, these plates will nevertheless not be entirely lost to science.

F. V. HAYDEN,
U. S. Geologist.

PLATE I.

FIG. 1. *Salix Meeki*, Newby., Notes on Later Extinct Floras, p. 19.

FIGS. 2, 3. *Salix cuneata*, Ny., *loc. cit.*, p. 21.

FIG. 4. *Salix flexuosa*, Ny., *loc. cit.*, p. 21.

FIGS. 5-8. *Salix membranacea*, Ny., *loc. cit.*, p. 19.

Analogous forms are described and figured as *Salix proteaefolia*, Lx., U. S. Geol. Reports of the Survey of the Territories, vol. vi, Cretaceous Flora, p. 60, pl. v, figs. 1-4.



PLATE II.

FIG. 1. *Quercus salicifolia*, Ny., *loc. cit.*, p. 24.

FIG. 2. *Magnolia obovata*, Ny., *loc. cit.*, p. 15.

FIG. 3. *Fagus cretacea*, Ny., *loc. cit.*, p. 24. Related to *F. polyclada*, Lx., Cret. Fl., p. 67, pl. v, fig. 6.

FIG. 4. *Platanus latiloba*, Ny., *loc. cit.*, p. 33. Compare *Sassafras* (*Araliopsis*) *mirabile*, Lx., Cret. Fl., p. 80, pl. xii, fig. 1.

FIG. 5, 5a. *Araucaria spatulata*, Ny., *loc. cit.*, p. 10.

FIG. 6. *Sphenopteris corrugata*, Ny., *loc. cit.*, p. 10. Compare *Hymenophyllum cretaceum*, Lx., Cret. Fl., p. 45, pl. 1, figs. 3, 4.

FIG. 7. *Pyrus ? cretacea*, Ny., *loc. cit.*, p. 12.



PLATE III.

FIGS. 1, 2. *Populus elliptica*, Ny., *loc. cit.*, p. 16.

FIGS. 3, 4. *Populus cyclophylla*, Heer. Proceed. Acad. Nat. Sci. Phil., 1858, p. 266. Not described, *loc. cit.*,
Lec., *Populites cyclophylla*, Lx., Cret. Fl., p. 59, pl. iv, fig. 5, and pl. xxiv, fig. 4.

FIG 5. *Populus microphylla*, Ny., *loc. cit.*, p. 17.

FIG. 6. *Populus litigiosa*, Heer, Phyll. du Neb., p. 13, pl. i, fig. 2.

FIG. 7. *Populus cordifolia*, Ny., *loc. cit.*, p. 18.

FIG. 8. *Diospyros primava*, Heer, Phyll. du Neb., p. 19, pl. i, fig. 6, 7.

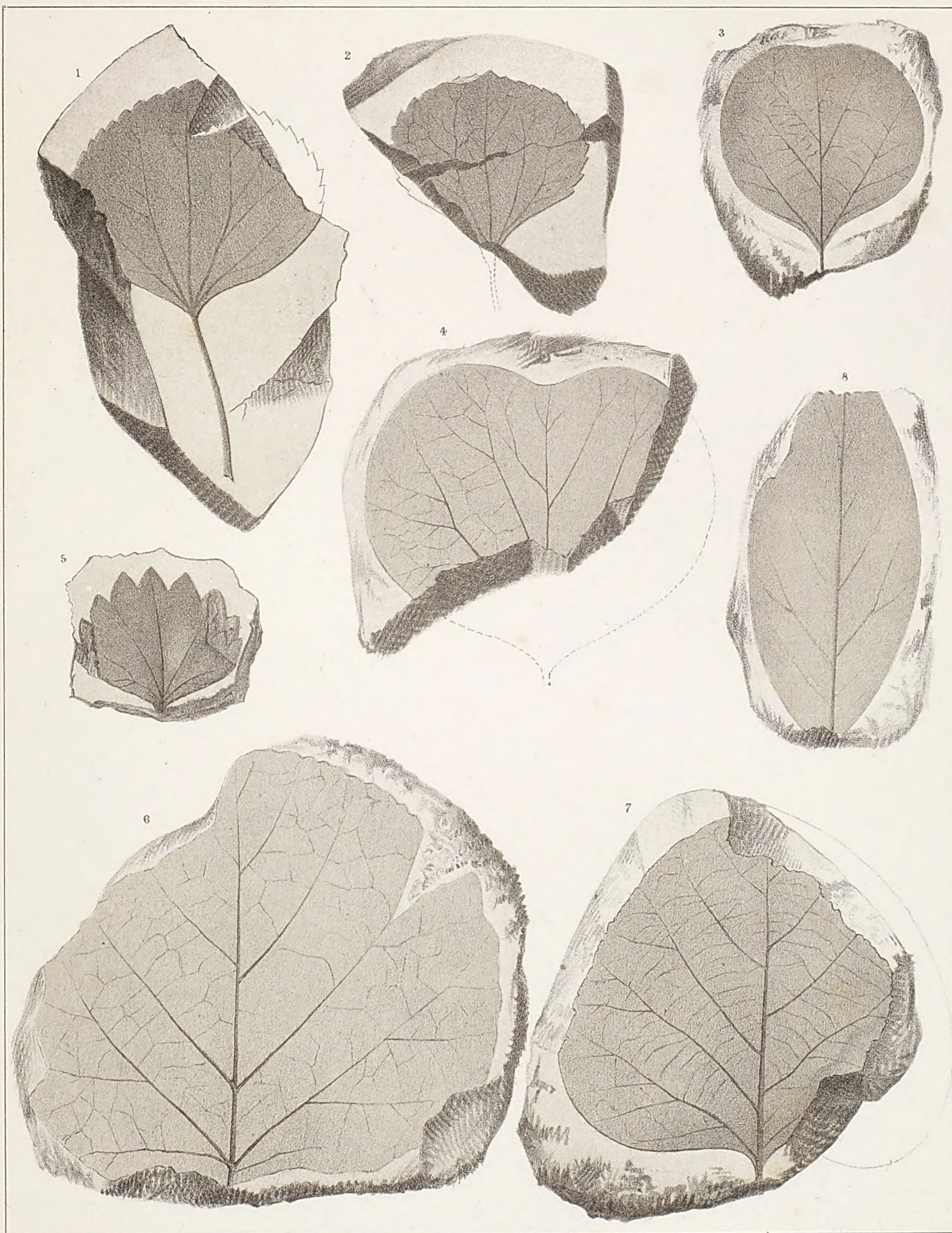


PLATE IV.

FIG. 1. *Populus litigiosa*, Heer, *loc. cit.*

FIG. 2. *Alnites grandifolia*, Ny., *loc. cit.*, in Catalogue, p. 9.

FIG. 3. *Populus ? debeyana*, Heer, Phyll. du Neb., p. 14, pl. 1, fig. 1.—Ny., *loc. cit.*, p. 17.

FIG. 4. *Magnolia obovata*, Ny., *loc. cit.*, p. 15.

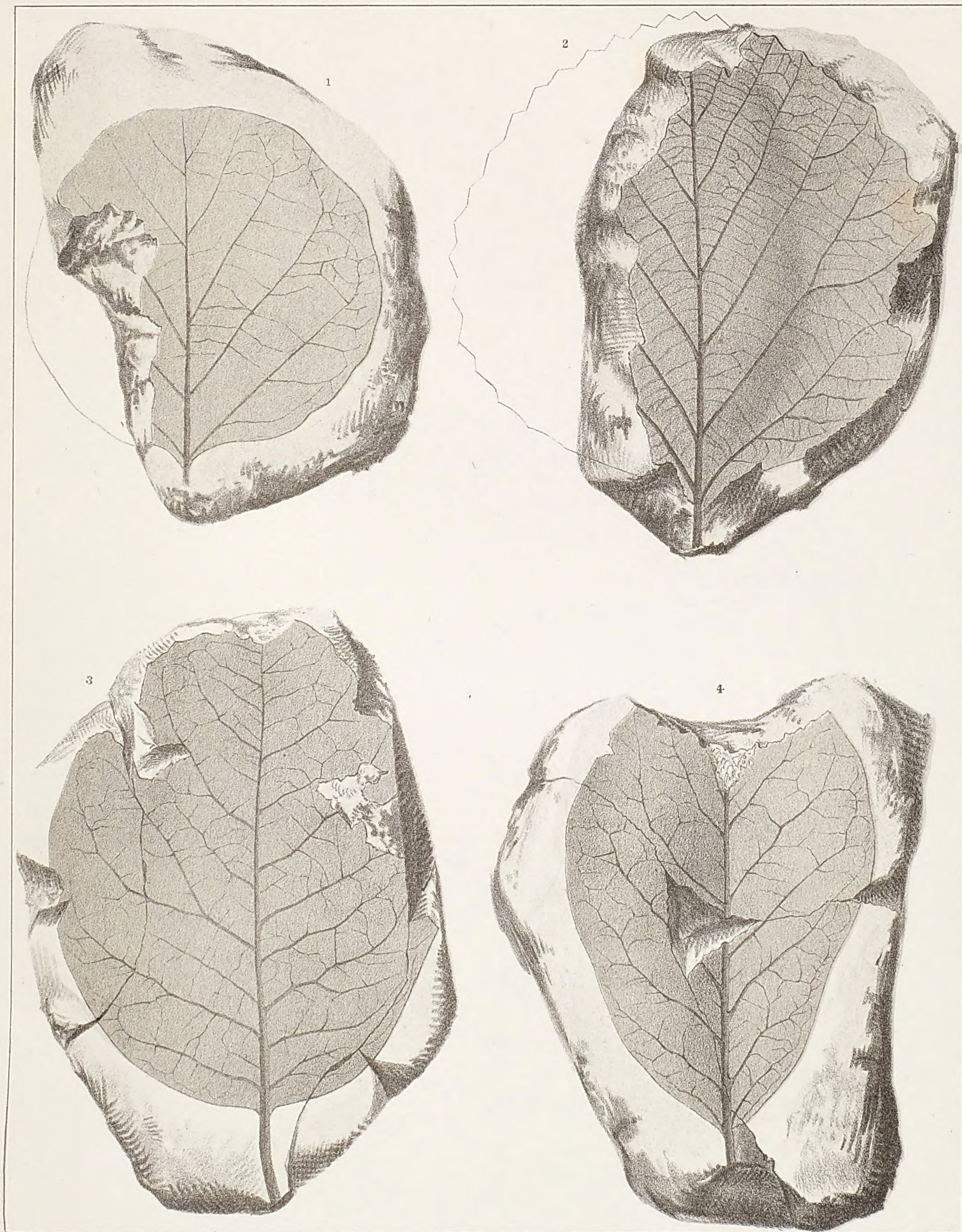


PLATE V.

FIG. 1. *Sapotacites Haydenii*, Heer.

FIG. 2. *Leguminosites Marcouanus*, Heer.

FIG. 3. *Phyllites obcordatus*, Heer.

FIG. 4. *Acerites pristinus*, Ny., *loc. cit.*, p. 15. Compare *Liquidambar integrifolium*, Lx., Cret. Fl., p. 56, pl. ii, figs. 1-3.

FIG. 5. *Populus cordifolia*, Ny., *loc. cit.*, p. 18.

FIG. 6. *Magnolia alternans*, Heer, Phill. du Neb., p. 20, pl. iii, figs. 2-4, and pl. iv, figs. 1, 2.

FIG. 7. *Populus Debeyana*, Heer, *loc. cit.*

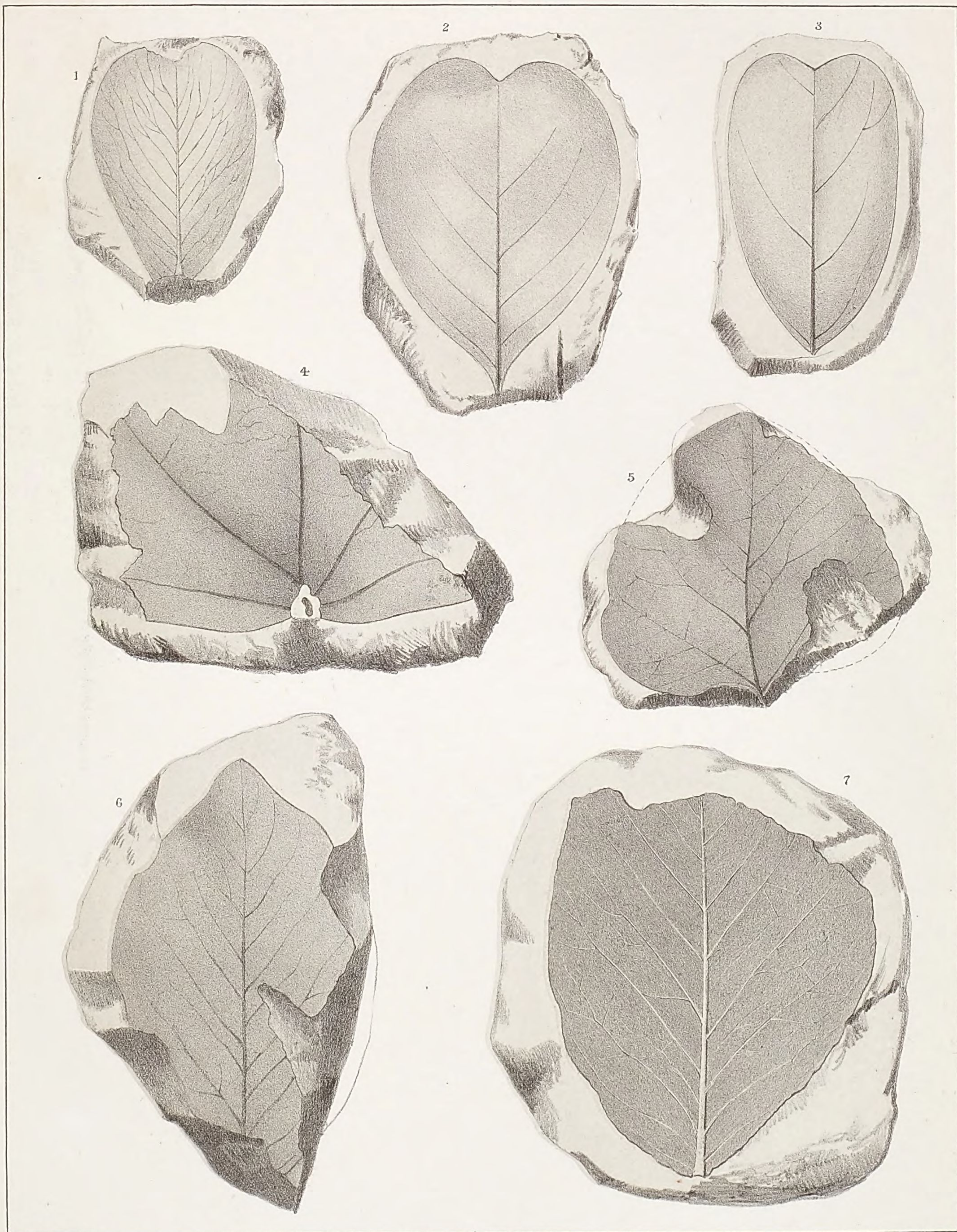


PLATE VI.

FIGS. 1-4. *Sassafras cretaceum*, Ny., *loc. cit.*, p. 14. Described in Cret. Fl., p. 80, pl. xi, figs. 1, 2; pl. xii, fig. 2.

FIG. 5. *Liriodendron Meekii*, Heer, Phill. du Neb., p. 21, pl. iv, figs. 3, 4.

FIG. 6. *Liriodendron primævum*, Ny., *loc. cit.*, p. 12. Compare *Liriodendron* species, Cret. Fl., p. 93, pl. xx, fig. 5.



PLATE VII.

- FIGS. 1, 2. Aquatic rootlets of *Equisetum* (not described).
FIG. 3. Root of some ligneous plant (not described).
FIG. 4. Radicle tubers of *Equisetum* (not described).
FIG. 5. Leaf of *Phragmites*, Newby., Later Extinct Floras, p. 38.
FIG. 5 a. Portion of *Phragmites* magnified.
FIG. 6. *Iris*? (not described).

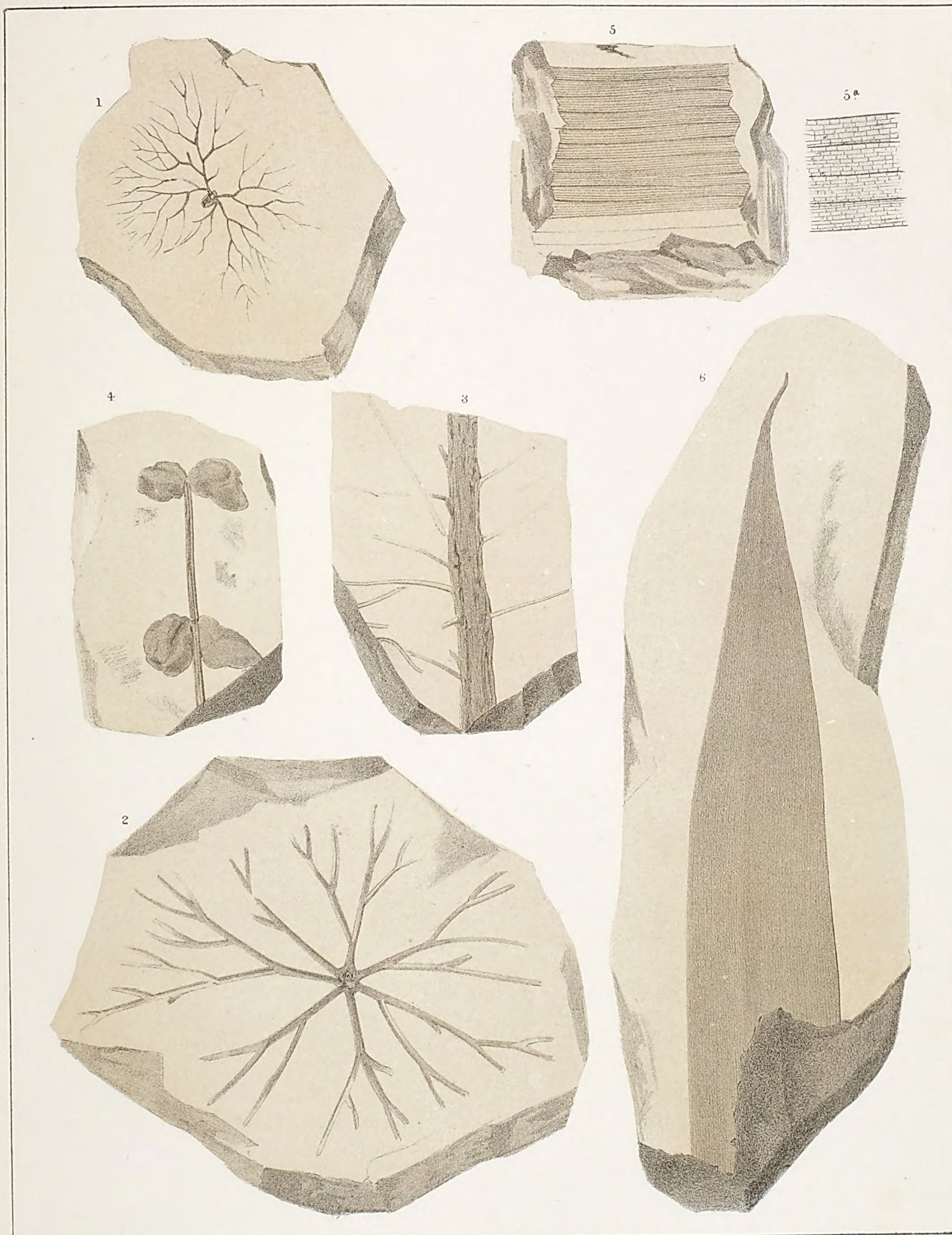


PLATE VIII.

FIG. 1. *Onoclea sensibilis*, Linn. in Ny., *loc. cit.*, pp. 39-41.

FIG. 2. *Equisetum* (not described).

FIG. 3. *Psilotum inerme*, Ny., *loc. cit.*, p. 38.



PLATE IX.

FIG. 1. *Onoclea sensibilis*, Linn. in Ny., *loc. cit.*, pp. 39-41.

FIG. 2. Under surface of frond, *loc. cit.*, pp. 39-41.

FIG. 3. Upper part and upper surface, *loc. cit.*, pp. 39-41.

FIG. 4. Nervation of living *O. sensibilis* var. *obtusilobata*, intermediate form, *loc. cit.*

FIG. 5. Lobate form of *O. sensibilis* var. *obtusilobata*, *loc. cit.*



PLATE X.

FIG. 1. *Sabal campbellii*, Ny., *loc. cit.*, p. 41. Described in U. S. Geol. Survey of the Territories, vol. vii, Tertiary Flora, p. 113.



PLATE XI.

FIGS. 1-3. *Taxodium occidentale*, Ny., *loc. cit.*, p. 45.

FIG. 4. *Sequoia Langsdorfi*, Brgt. in Ny., *loc. cit.*, p. 46. Described also in Tert. Fl., p. 76.

FIGS. 5, 5 a. *Thuya interrupta*, Ny., *loc. cit.*, p. 42.

FIGS. 6-8 a. *Glyptostrobus Europæus*, Brgt. in Ny., *loc. cit.*, p. 43. Described also in Tert. Fl., p. 74.

FIG. 9. Cone of *Sequoia* (not described).



PLATE XII.

FIG. 1. *Populus genatrix*, Ny., *loc. cit.*, p. 64.

FIGS. 2, 3. *Populus nervosa*, Ny., *loc. cit.*, p. 61.

FIGS. 4, 5. *Populus Nebraskaensis*, Ny., *loc. cit.*, p. 62.



PLATE XIII.

FIGS. 1-(4 ?). *Populus nervosa*, var. β . *elongata*, Ny., loc. cit., p. 62.

FIGS. 5-8. *Populus acerifolia*, Ny., loc. cit., p. 65.

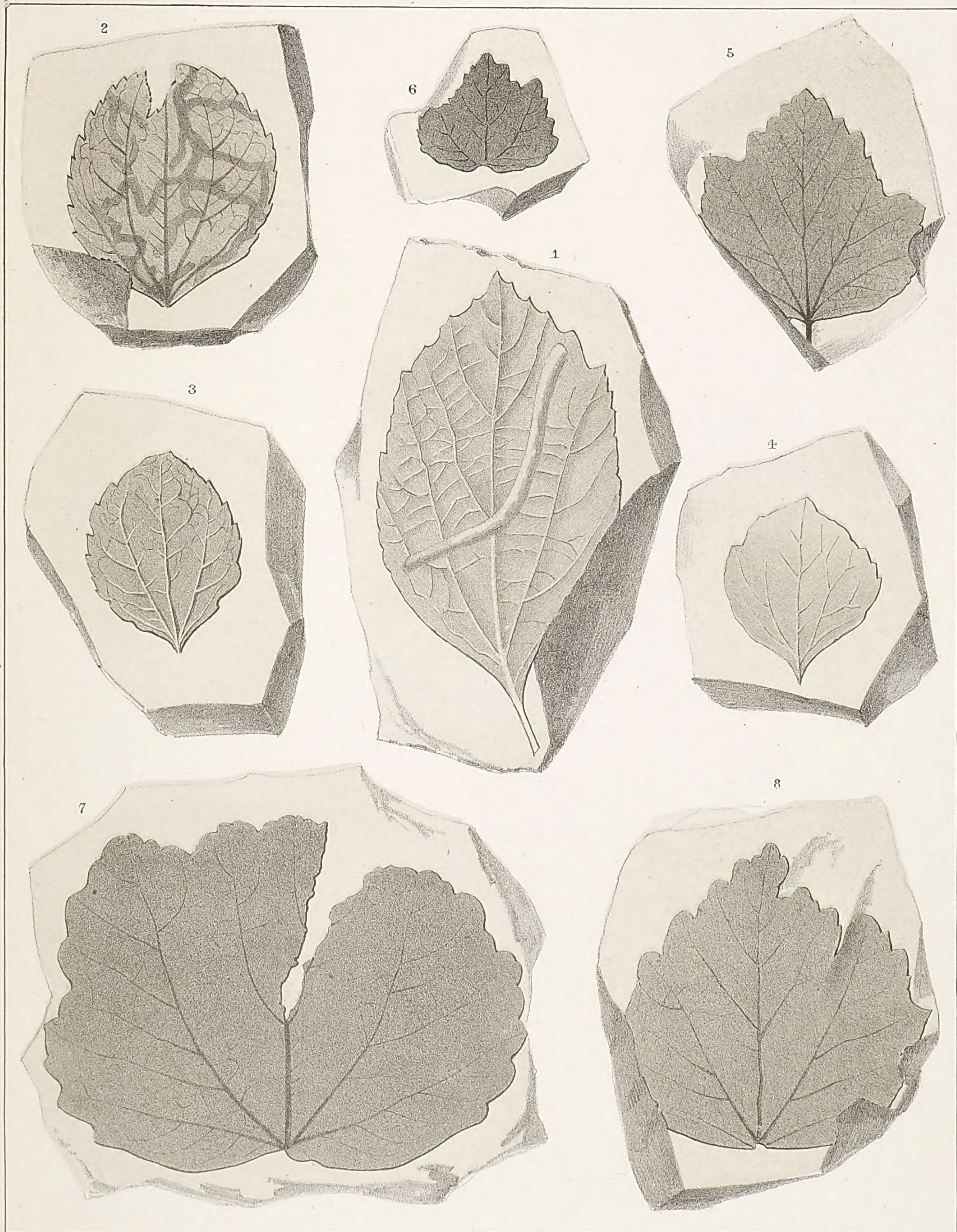


PLATE XIV.

FIGS. 1-4. *Populus cuneata*, Ny., *loc. cit.*, p. 64.

FIG. 5. *Populus smilacifolia*, Ny., *loc. cit.*, p. 66.

FIG. 6. *Populus cordata*, Ny., *loc. cit.*, p. 60.

FIG. 7. *Populus nebrascensis*, Ny., *loc. cit.*, p. 62 (?). I do not know positively the reference; leaves of character similar to that of pl. xii, fig. 5.

FIGS. 8-10. *Corylus Americana*, Walt. in Ny., *loc. cit.*, p. 59.

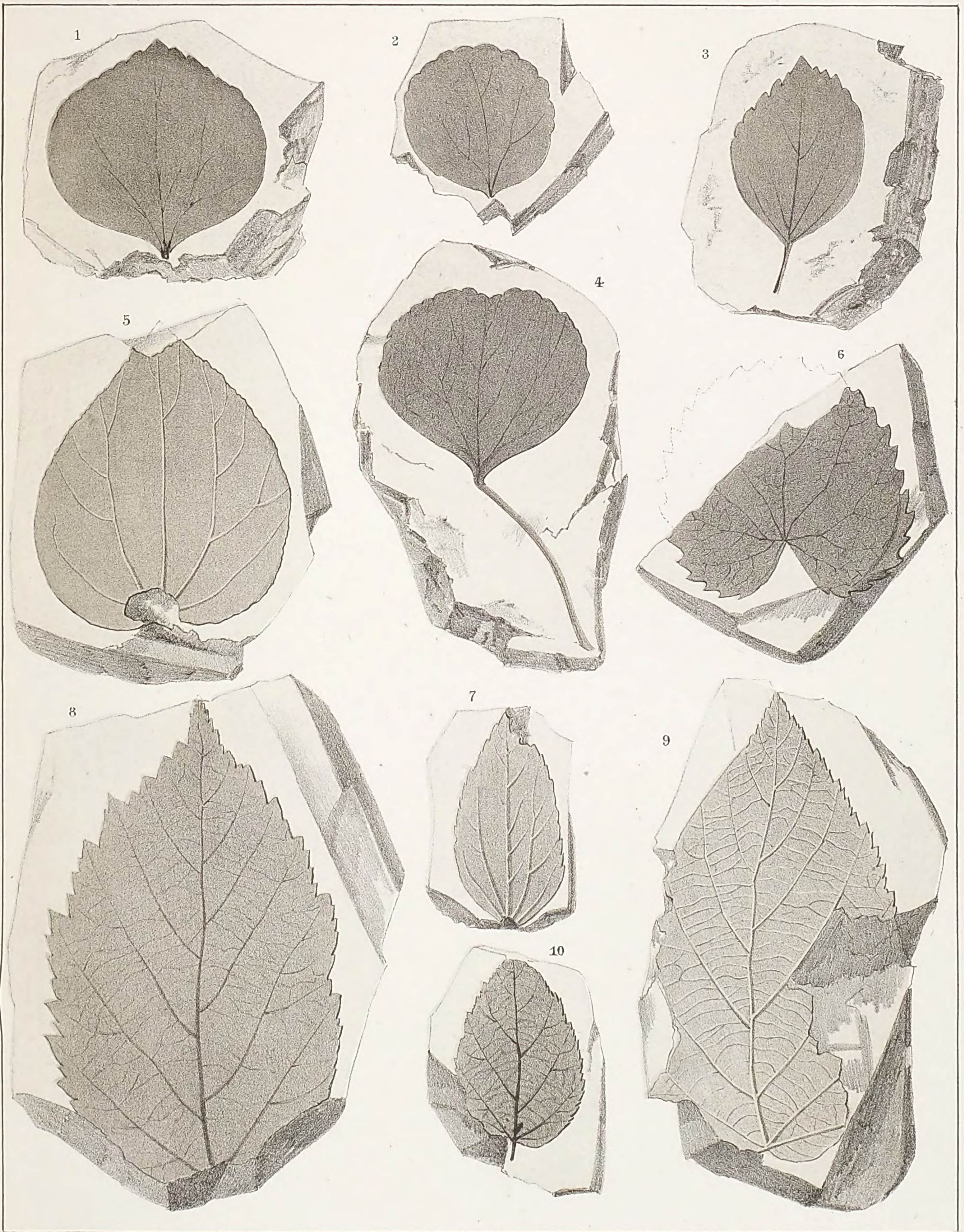


PLATE XV.

FIGS. 1-3. *Corylus rostrata*, Ait. in Ny., *loc. cit.*, p. 60.

FIG. 4. *Corylus orbiculata*, Ny., *loc. cit.*, p. 58.

FIG. 5. *Corylus grandifolia*, Ny., *loc. cit.*, p. 59.

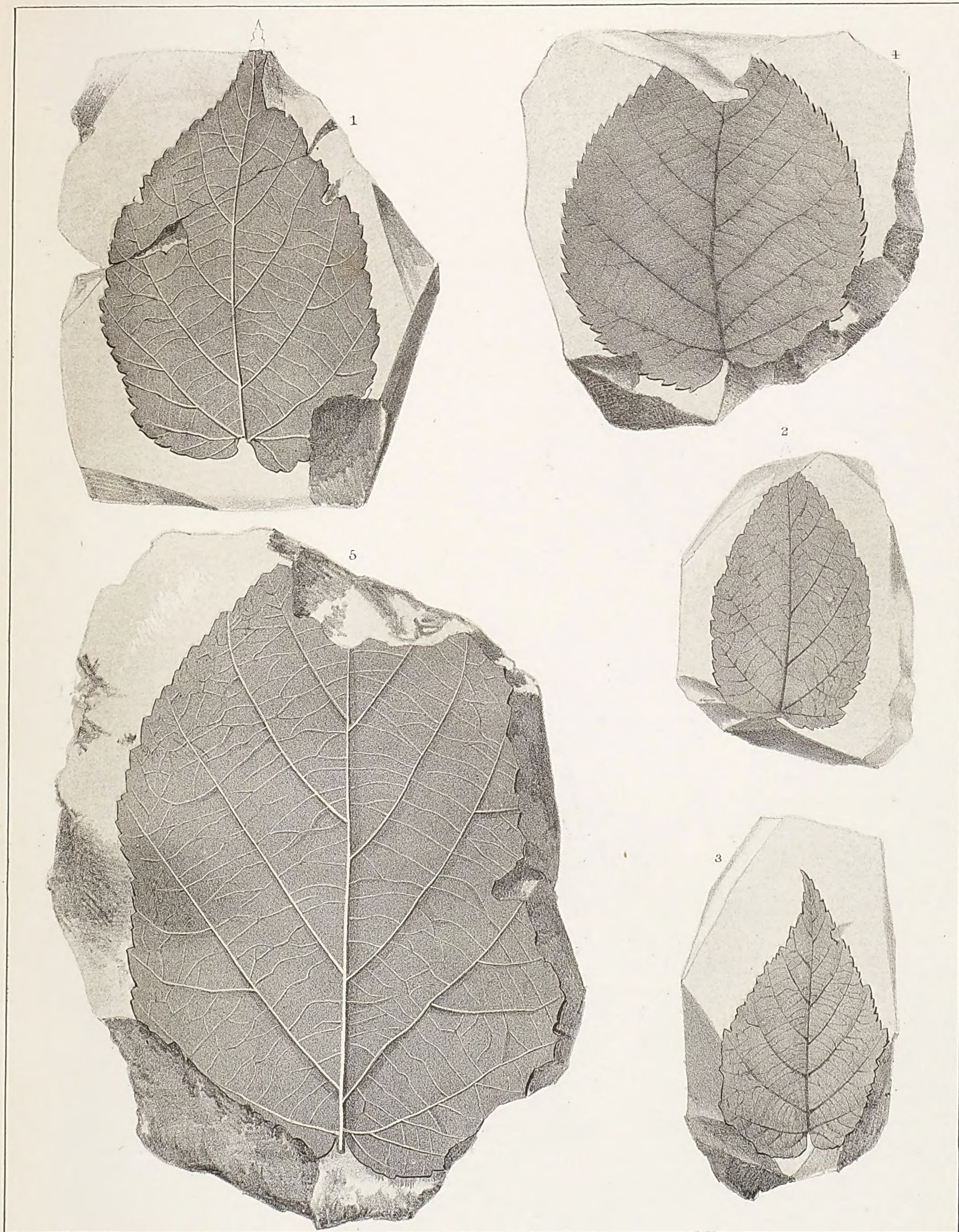


PLATE XVI.

- FIGS. 1, 2. *Tilia antiqua*, Ny., *loc. cit.*, p. 52.
FIGS. 3, 4. *Planera microphylla*, Ny., *loc. cit.*, p. 55.
FIGS. 5, 6. *Rhus nervosa*, Ny., *loc. cit.*, p. 53.
FIG. 7. *Rhamnites concinnus*, Ny., *loc. cit.*, p. 50.
FIGS. 8, 9. *Viburnum asperum*, Ny., *loc. cit.*, p. 54.
FIG. 10. *Viburnum lanceolatum*, Ny., *loc. cit.*, p. 54.
FIG. 11. *Alnus serrata*, Ny., *loc. cit.*, p. 55

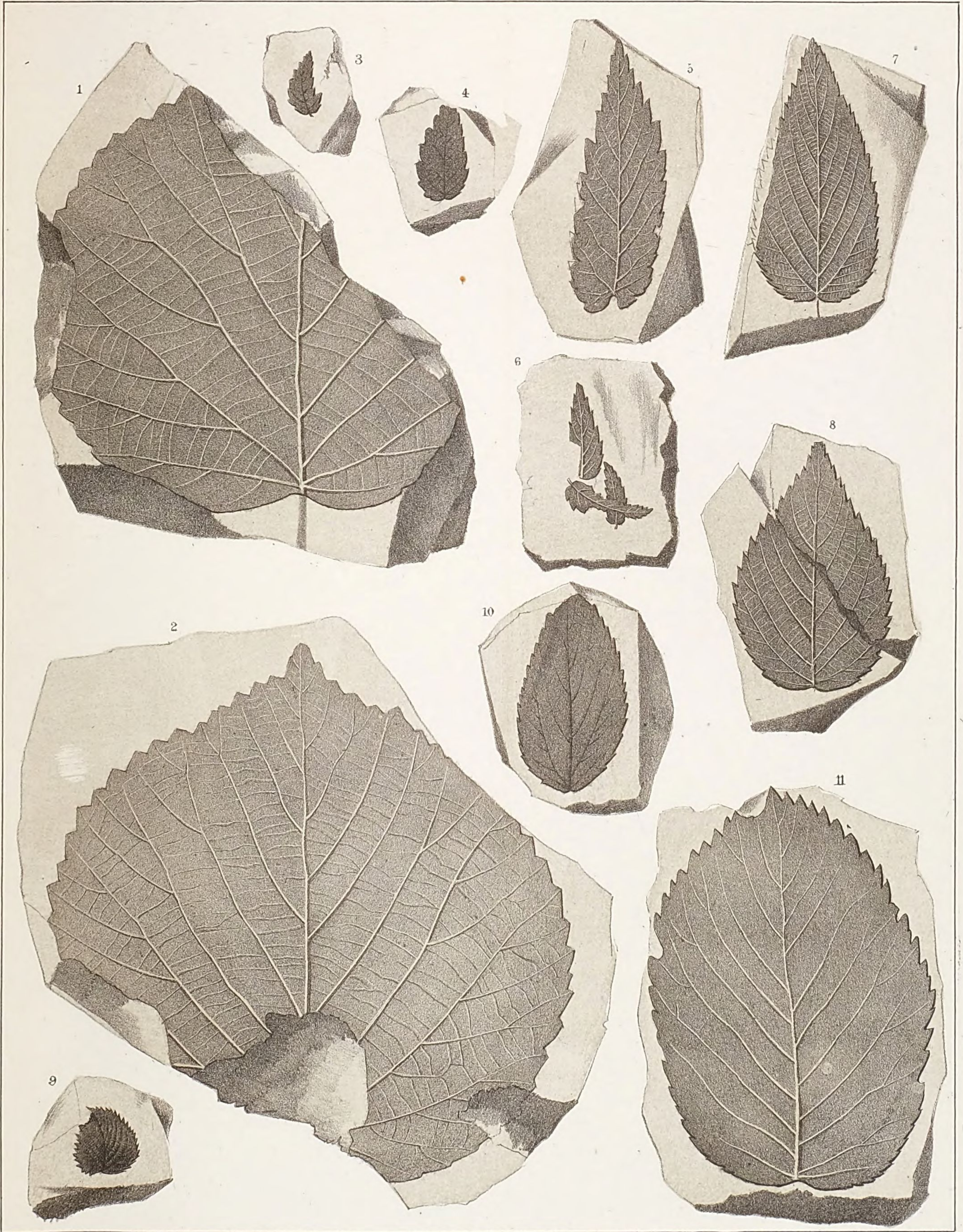


PLATE XVII.

FIG. 1. *Platanus nobilis*, Ny., *loc. cit.*, p. 67. Compare *Aralia notata*, Lx., Tert. Fl., p. 237, pl. xxxix, figs. 2-4.



PLATE XVIII.

FIG. 1. *Platanus Raynoldsii*, Ny., *loc. cit.*, p. 69.

Described with various forms, Tert. Fl., p. 185, pl. xxvi, figs. 4, 5; and pl. xxvii, figs. 1-3.



PLATE XIX.

FIG. 1. *Platanus Haydenii*, Ny., *loc. cit.*, p. 70. Mentioned in Tert. Fl., p. 182.



PLATE XX.

FIG. 1. *Platanus Haydenii*, Ny., *loc. cit.*, p. 70. A young leaf.

FIGS. 2-4. *Cornus acuminata*, Ny., *loc. cit.*, p. 71. Compared to *Juglans rhamnoides*, Lx., Tert. Fl., p. 285.

FIG. 5. *Phyllites cupanioides*, Ny., *loc. cit.*, p. 74.



PLATE XXI.

FIG. 1. No description of this leaf. It is a var. of *Platanus Haydenii*, Ny., often found at Golden with the lobate leaves of this species even upon the same specimens.

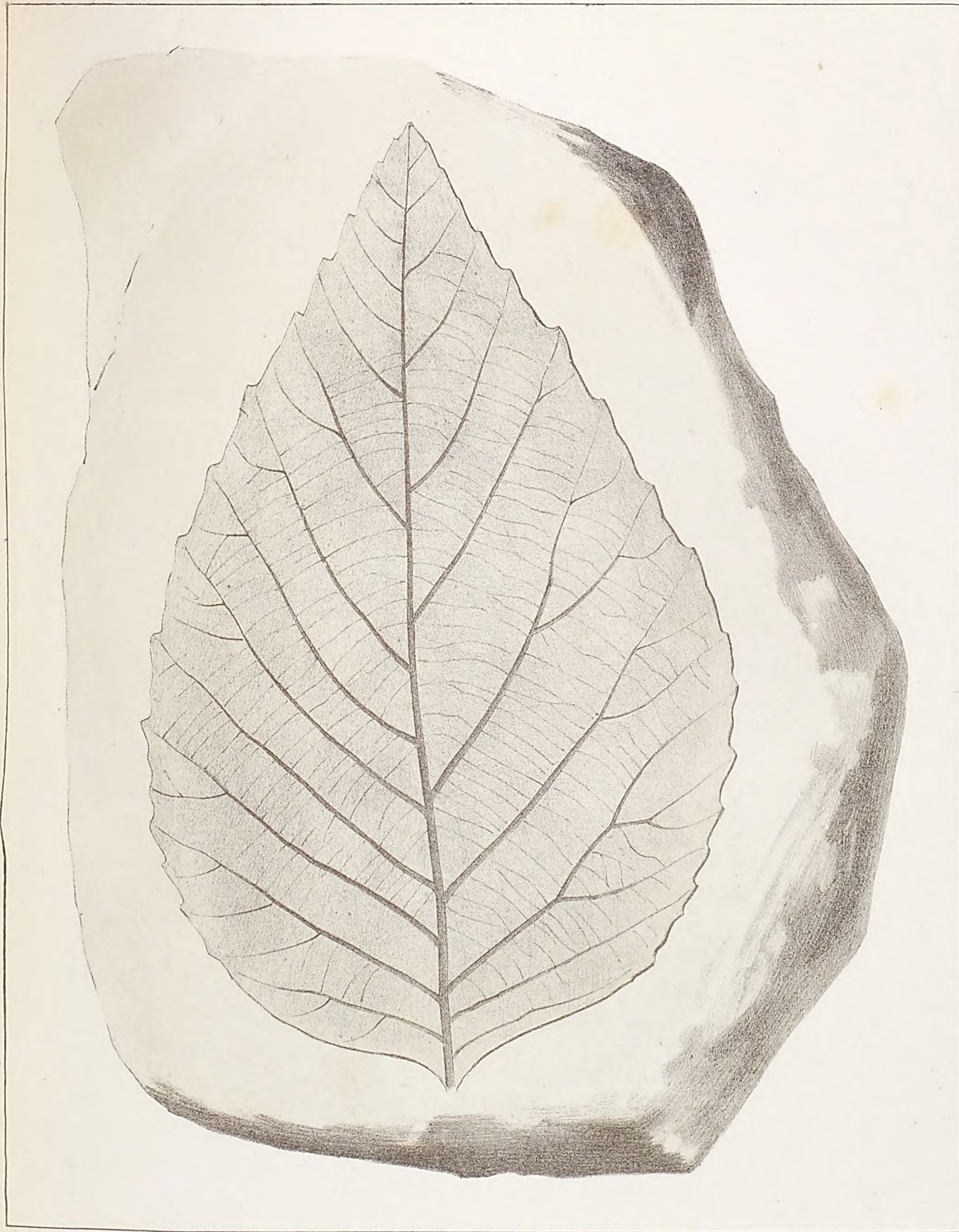


PLATE XXII.

FIG. 1. *Catalpa crassifolia*, Ny., *loc. cit.*, p. 56.

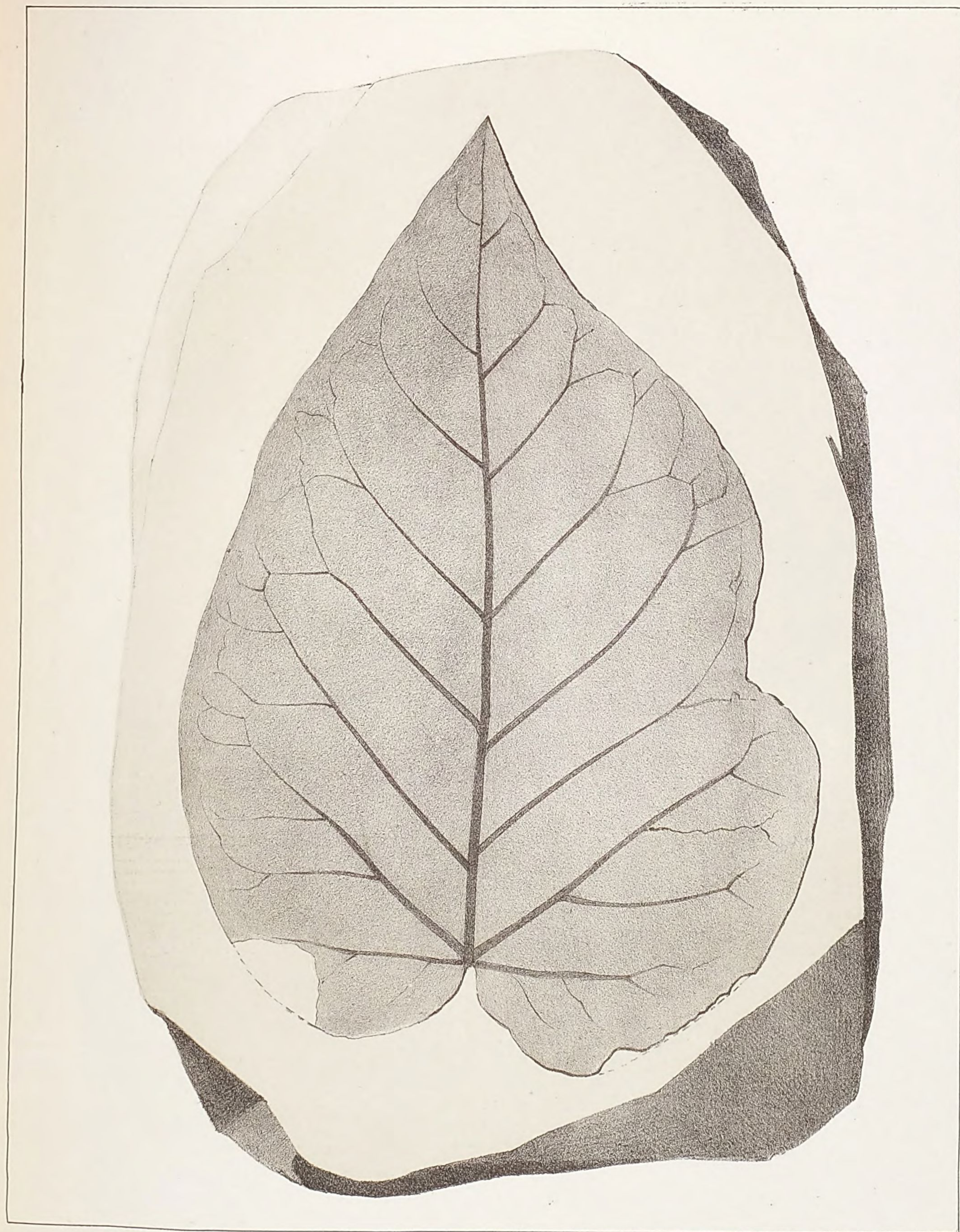


PLATE XXIII.

FIGS. 1-4. *Carya antiquorum*, Ny., *loc. cit.*, p. 72. Described and figured in Tert. Fl., p. 289, pl. lvii, figs. 1-5; and pl. lviii, fig. 2, in its various forms.

FIG. 5. *Negundo triloba*, Ny., *loc. cit.*, p. 57.



PLATE XXIV.

FIG. 1. *Sapindus affinis*, Ny., *loc. cit.*, p. 51.

FIGS. 2, 3. *Sapindus membranaceus*, Ny., *loc. cit.*, p. 52. Comparable to *S. obtusifolius*, Lx., Tert. Fl., p. 266, pl. xlix, figs. 10-11.

FIG. 4. *Phyllites venosus*, Ny., *loc. cit.*, p. 75.



PLATE XXV.

- FIG. 1. *Carpolithes lineatus*, Ny., mentioned, *loc. cit.*, Catalogue, p. 31. Described and figured in Tert. Fl., pl. 302, pl. lx, figs. 1-1 d.
- FIG. 2. *Sapindus affinis*, Ny., *loc. cit.*, p. 51.
- FIG. 3. *Calycites polysepalus*, Ny., recorded, *loc. cit.*, Catalogue, p. 31.
- FIG. 4, (5?). *Aralia triloba*, Ny., *loc. cit.*, p. 58.
- FIG. 6. *Amelanchier similis*, Ny., *loc. cit.*, p. 48.
- FIG. 7. *Aristolochia cordifolia*, Ny., *loc. cit.*, p. 74

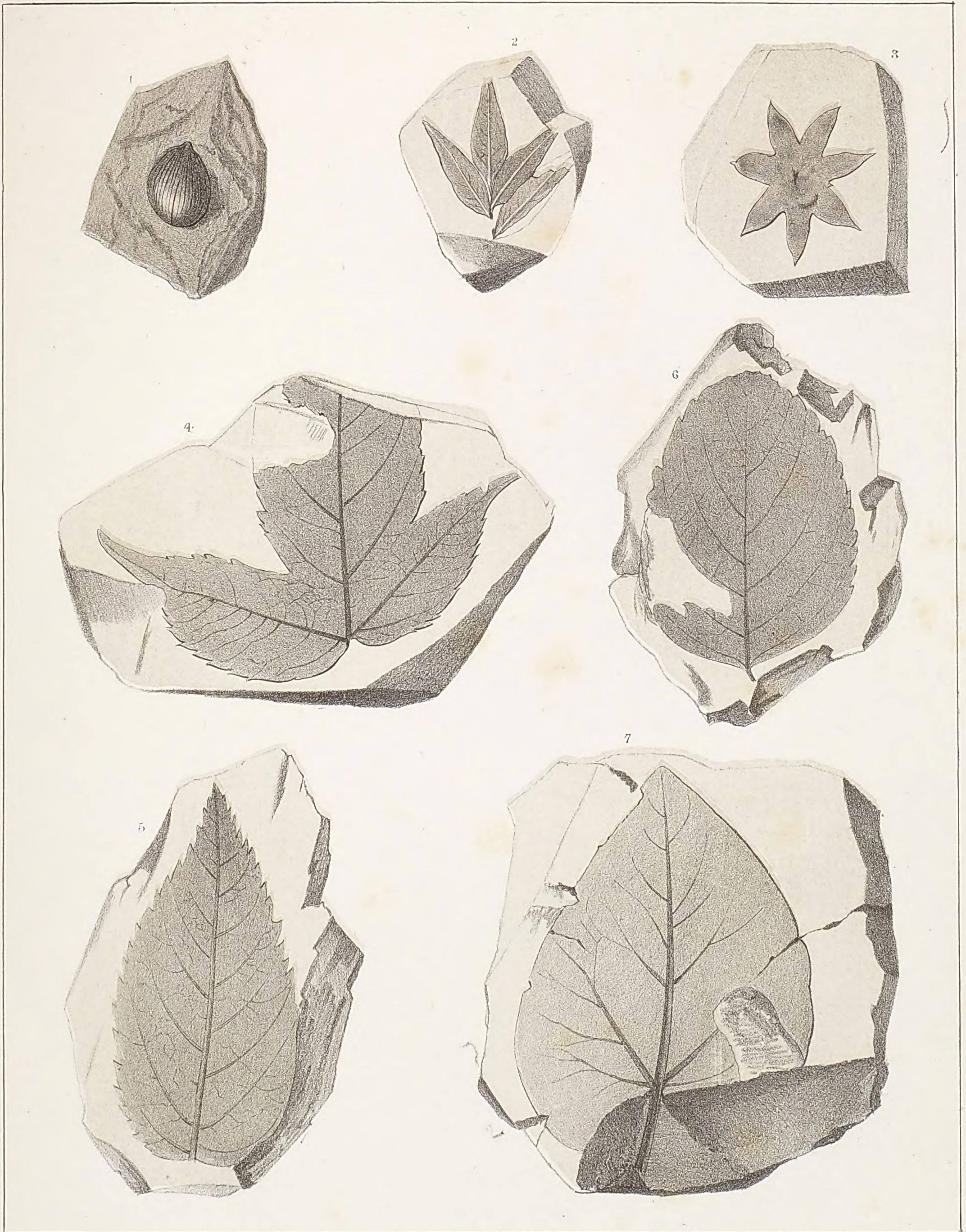


PLATE XXVI.

FIGS. 1, 2. *Phyllites carneous*, Ny., loc. cit., p. 75.

FIGS. 3, 4. *Phyllites venosus*?, Ny., loc. cit., p. 75.



Hayden, Ferdinand V.,

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